(12) UK Patent Application (19) GB (11) 2 209 049 (13) A

(43) Date of A publication 26.04.1989

(21) Application No 8816938.8

(22) Date of filing 15.07.1988

(30) Priority data
(31) 8716878 (32) 17.07.1987 (33) GB

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(51) INT CL⁴
E05B 63/14

(52) UK CL (Edition J)
E2A AAT A160 A190 A420
U1S S1714

(56) Documents cited
GB 1354285 A US 3756642 A

(58) Field of search
UK CL (Edition J) E2A
INT CL⁴ E05B

(54) Securing means

(57) A door 120 is held in position by bolt members 132 (133, Fig. 11 not shown) which emerge from the floor one at each side, and are actuated by a door-mounted bolt 21 via a further floor-mounted member 123. The members (132, 123) may be interconnected by pivotal levers 142 (143) by a pivotal spindle (81, Figs 7 to 9 not shown) or by a hydraulic arrangement (10, 50, 60 Figs 1 to 3 not shown). The door incorporates keep sockets 152 for receiving bolt members 132 (133) and protecting them from damage.

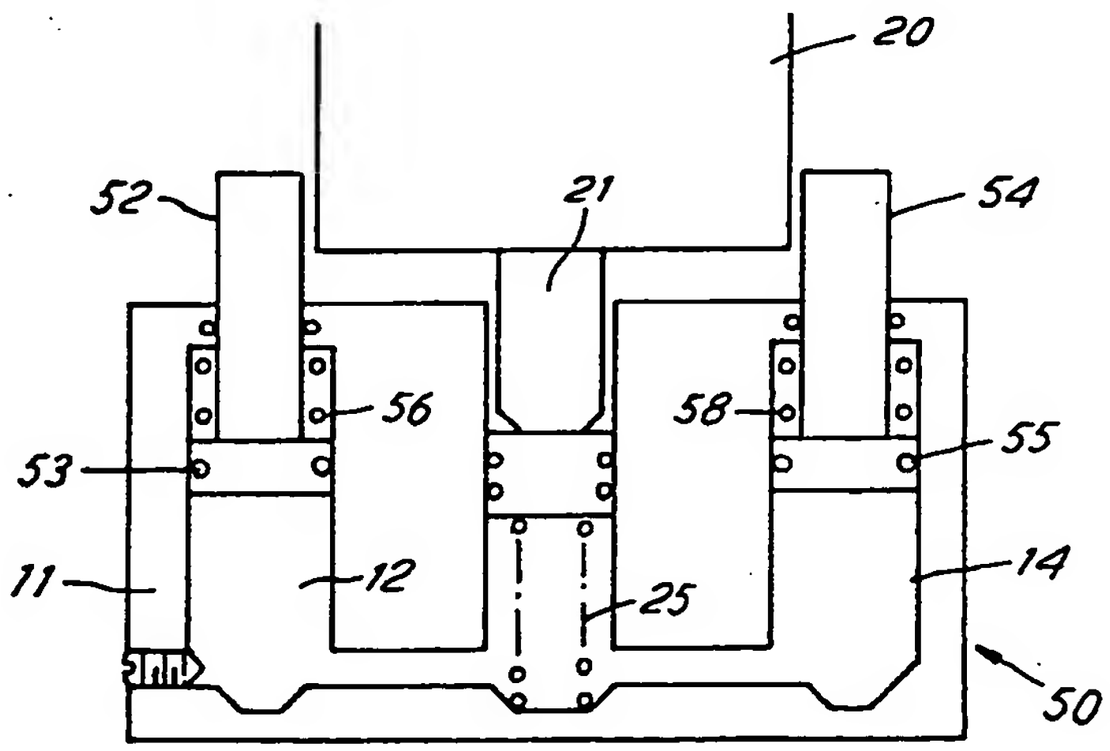

FIG. 2

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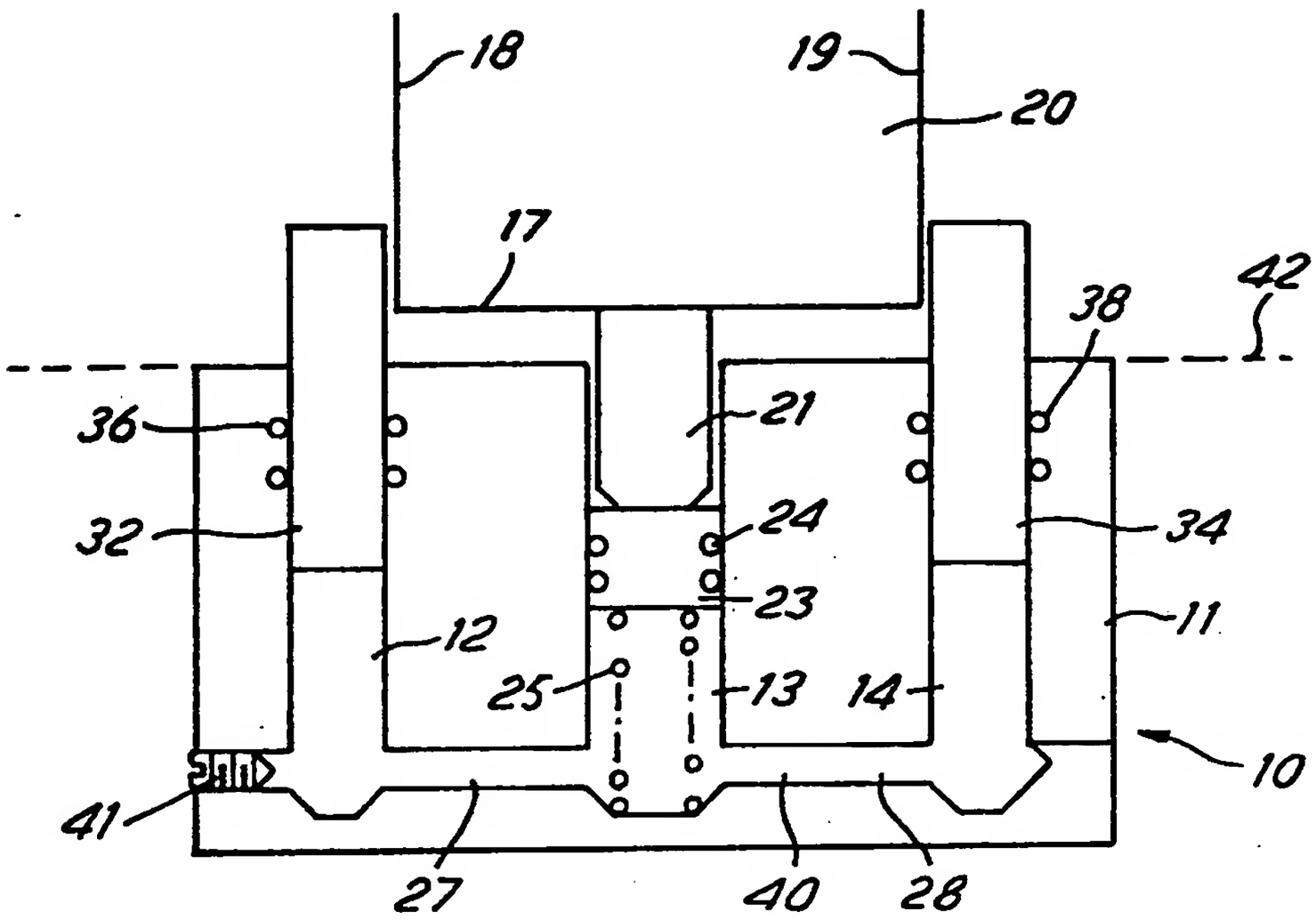
18
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42
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41
27
40
28

FIG.1

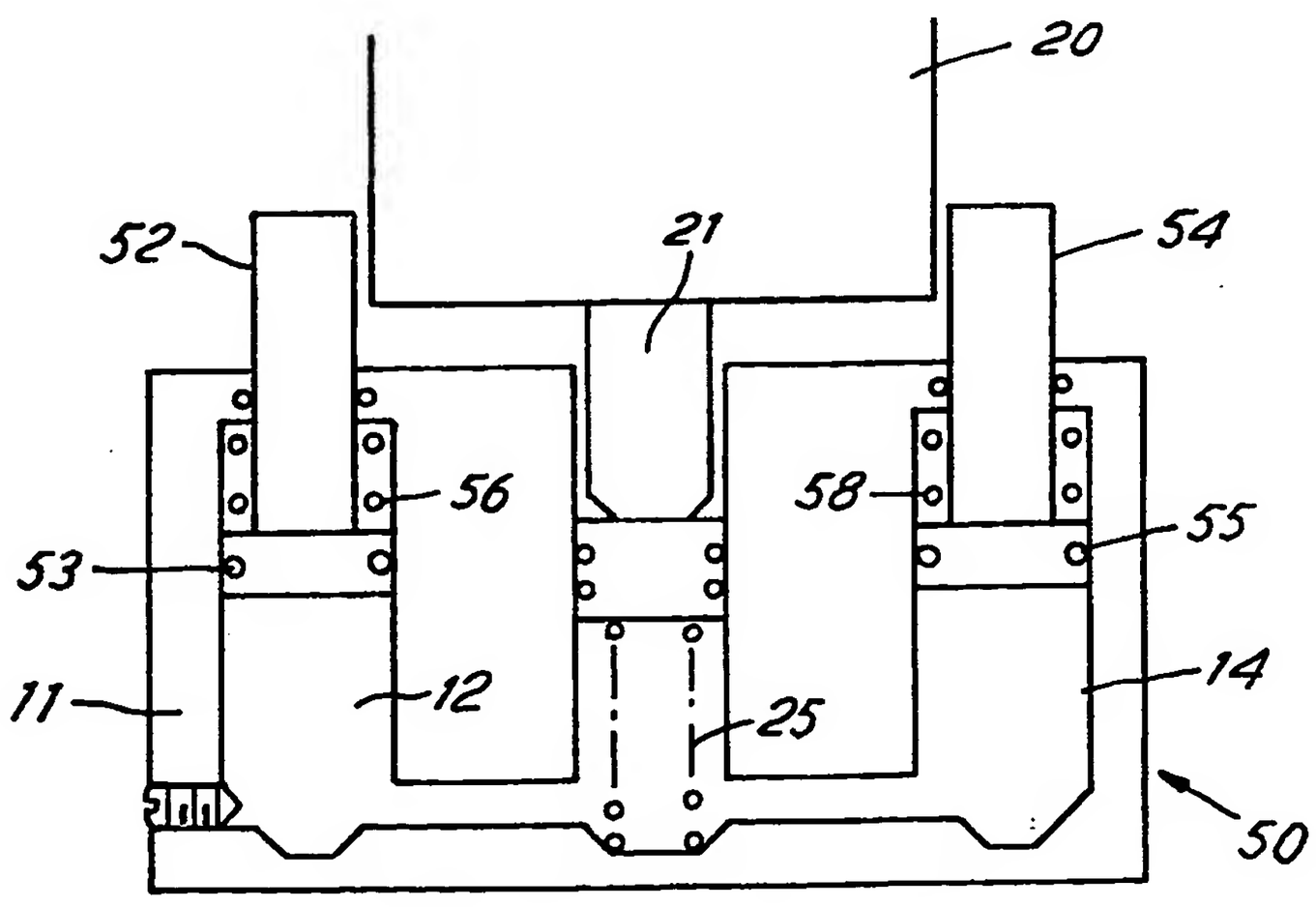
20
52
21
54
56
58
53
55
11
12
25
14
50

FIG.2

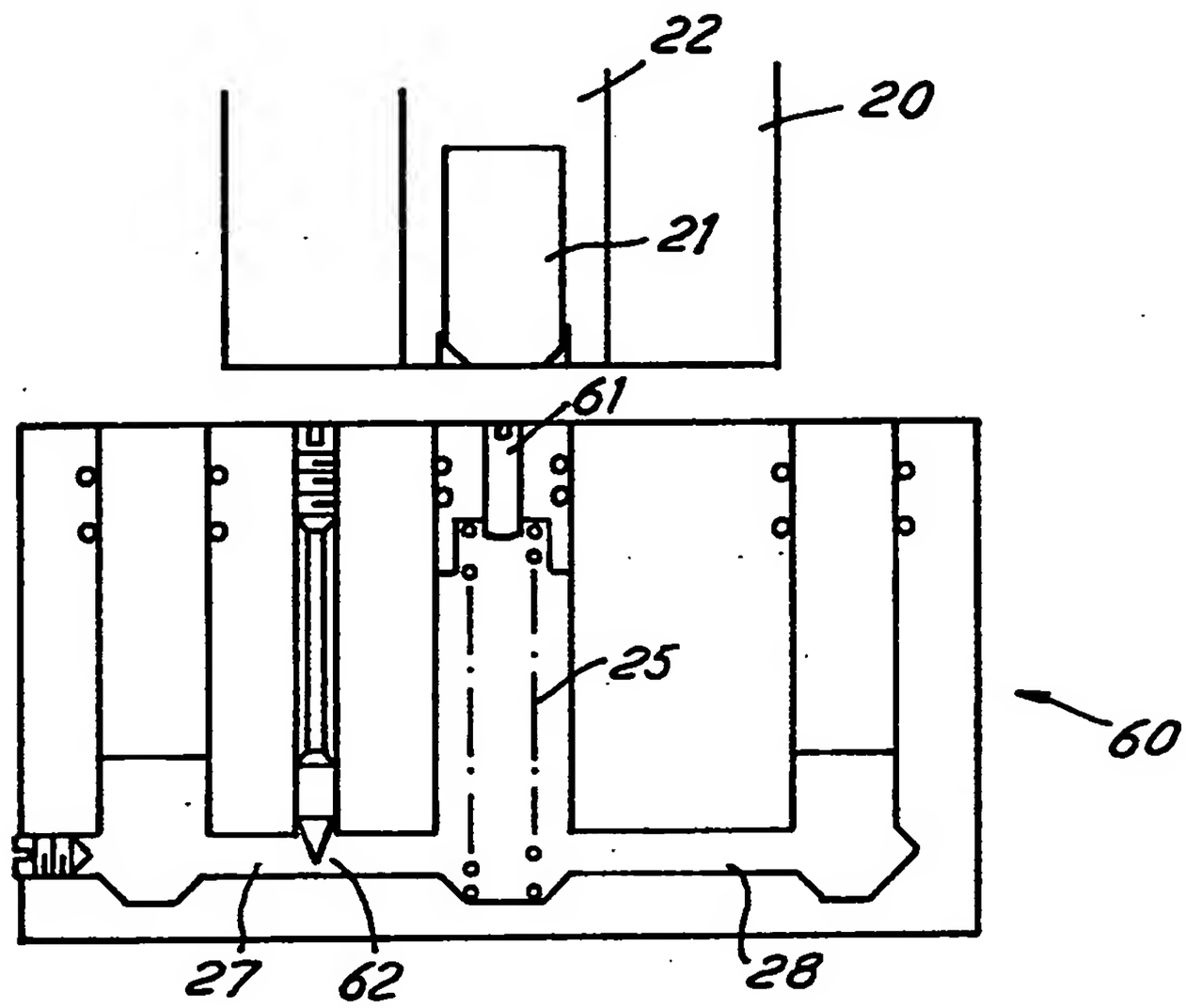

FIG.3

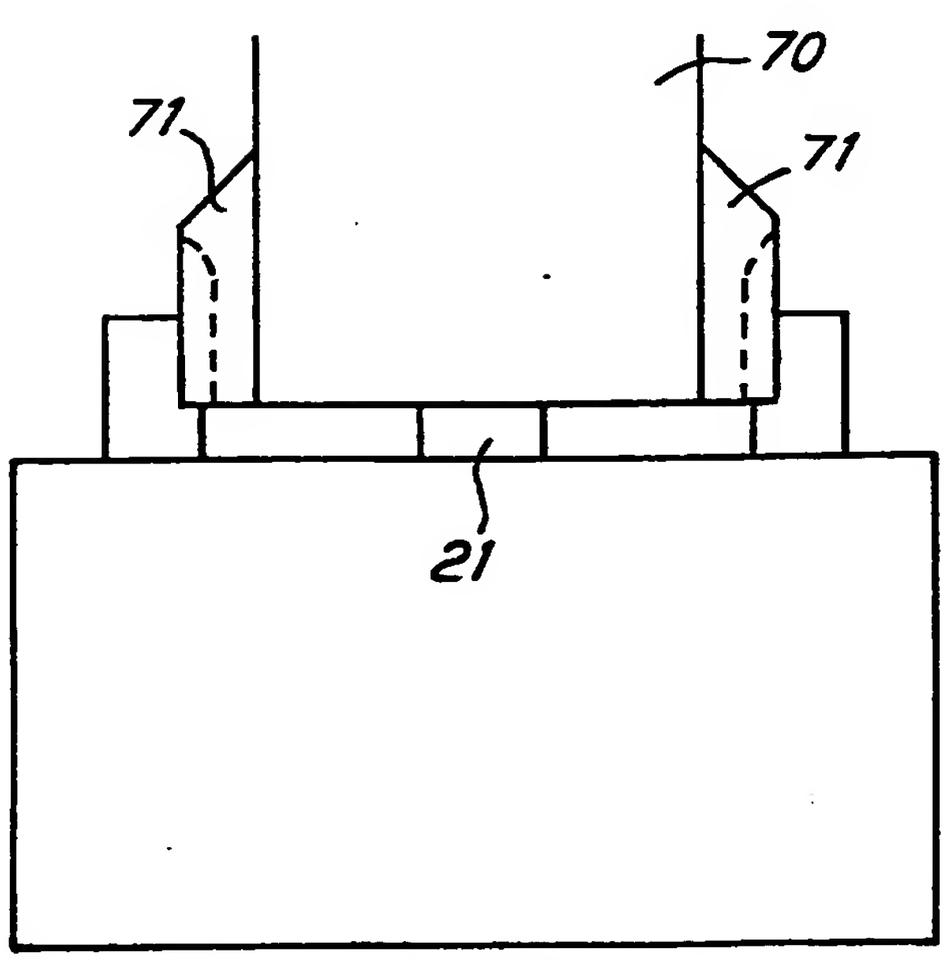

FIG.4

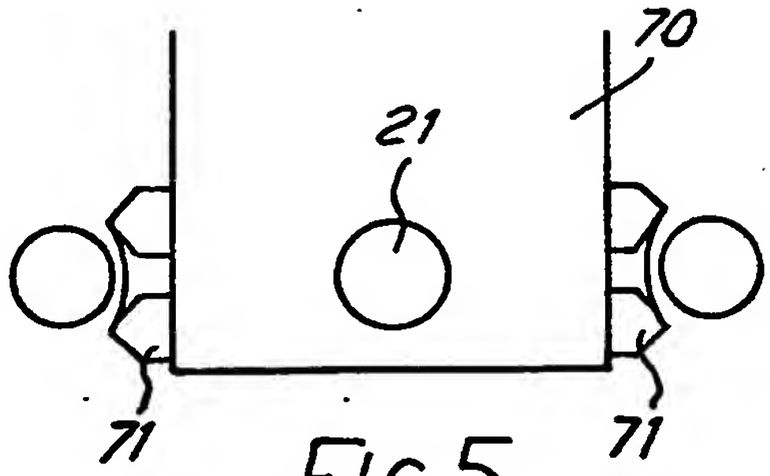

FIG.5

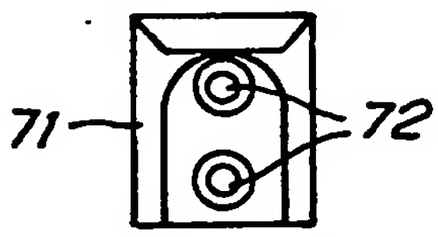

FIG.6

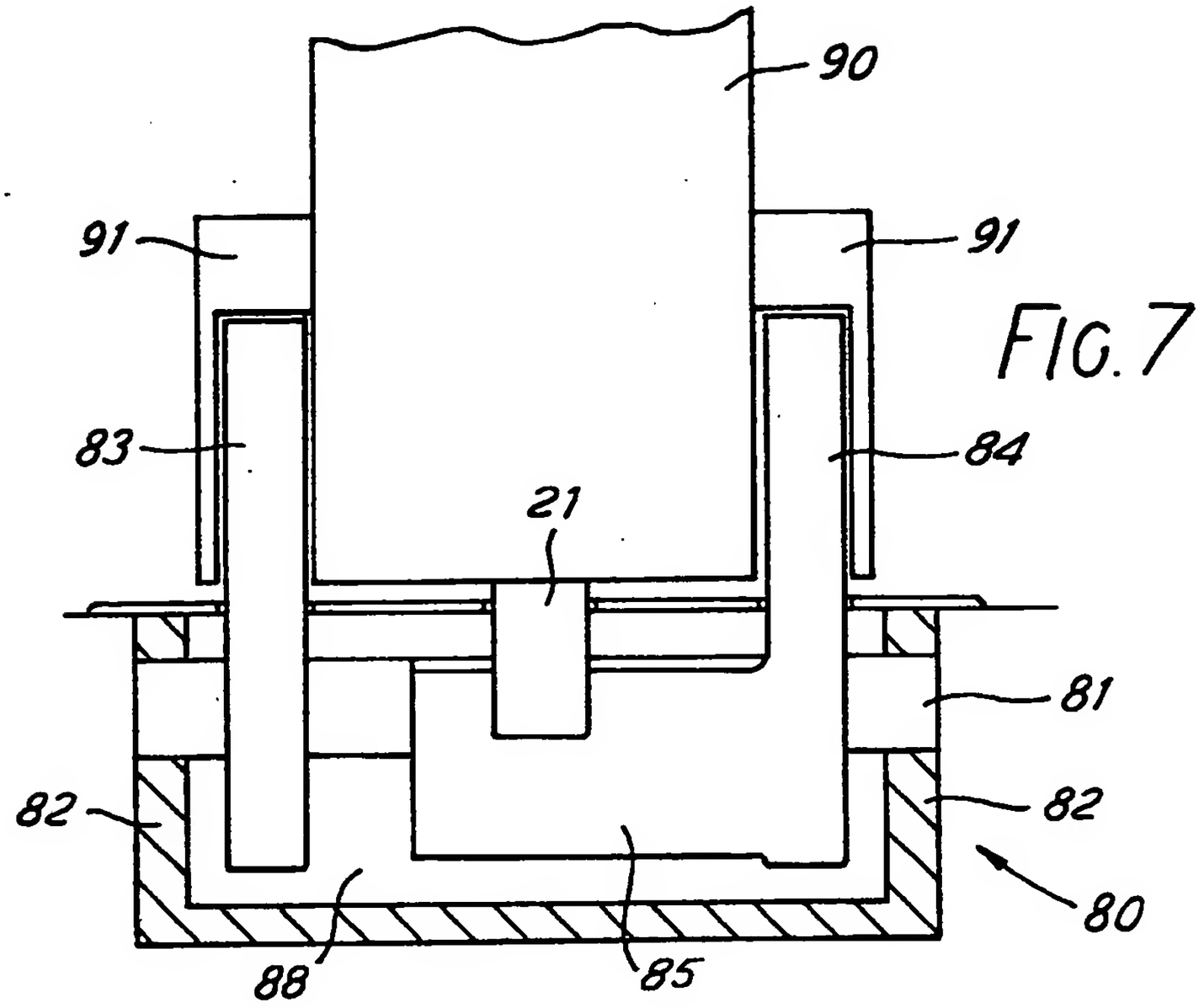
90
91
91
83
84
21
81
82
82
80
88
85

FIG. 7

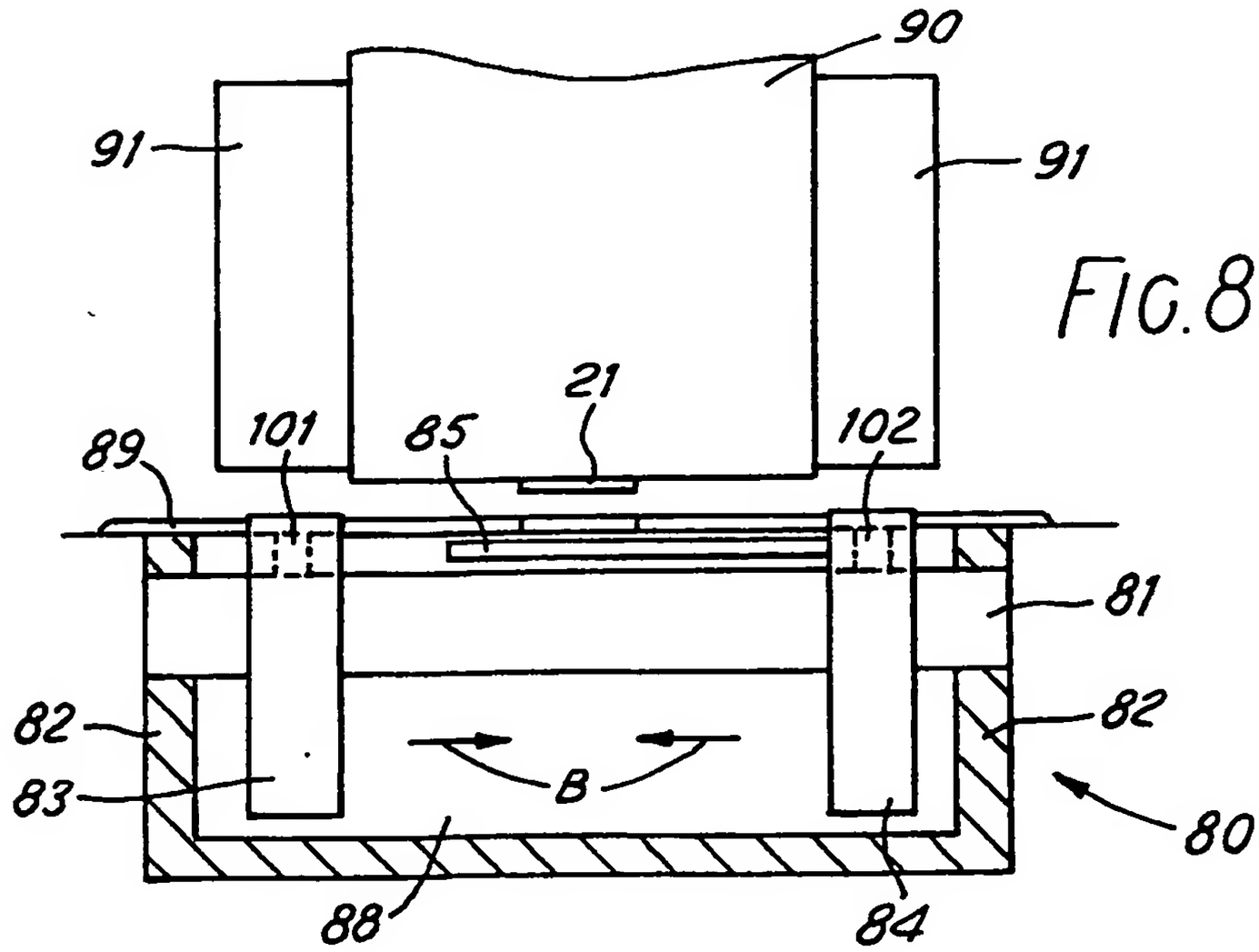
90
91
91
21
89
101
85
102
81
82
82
B
83
80
88
84

FIG. 8

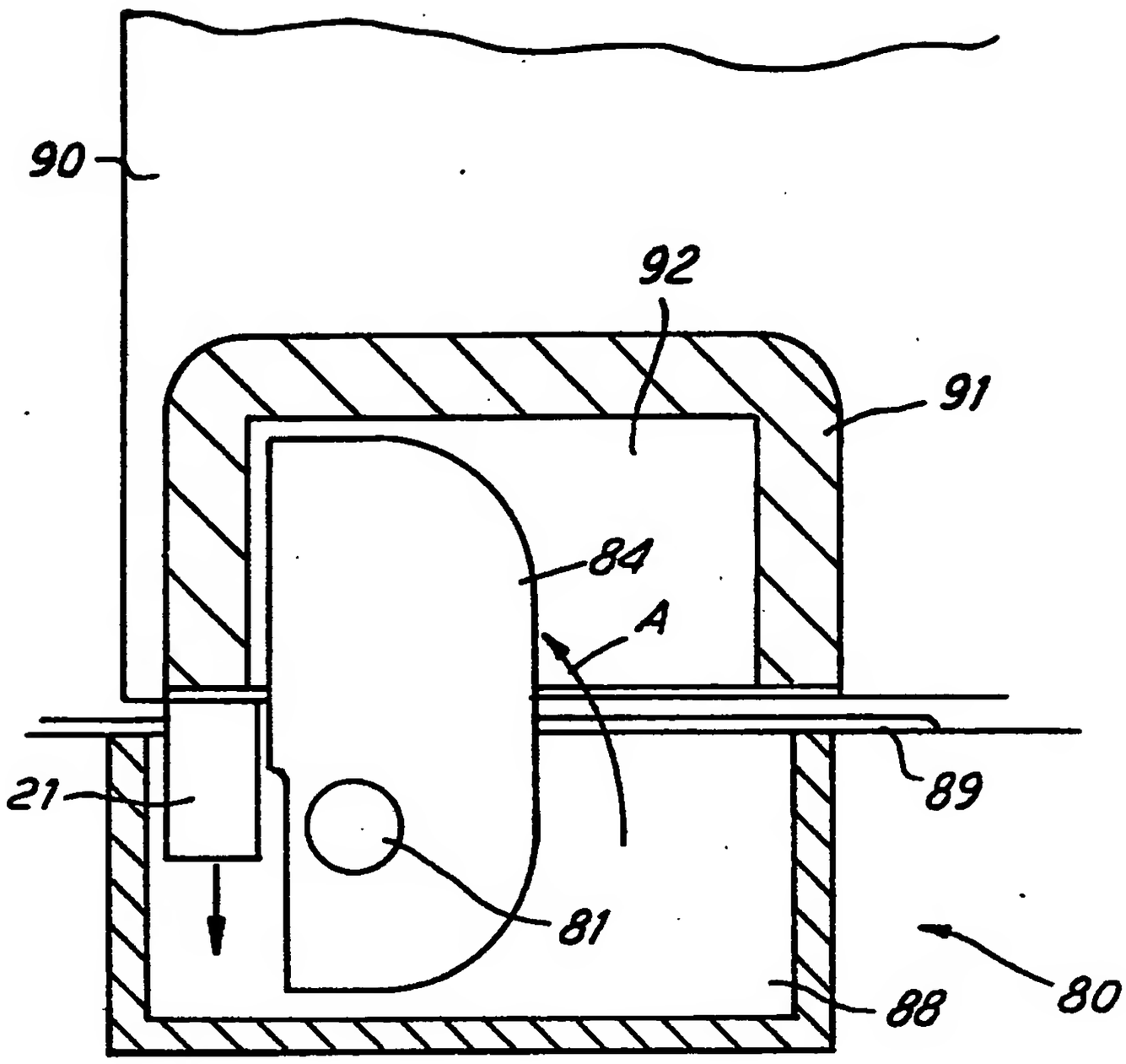

FIG. 9

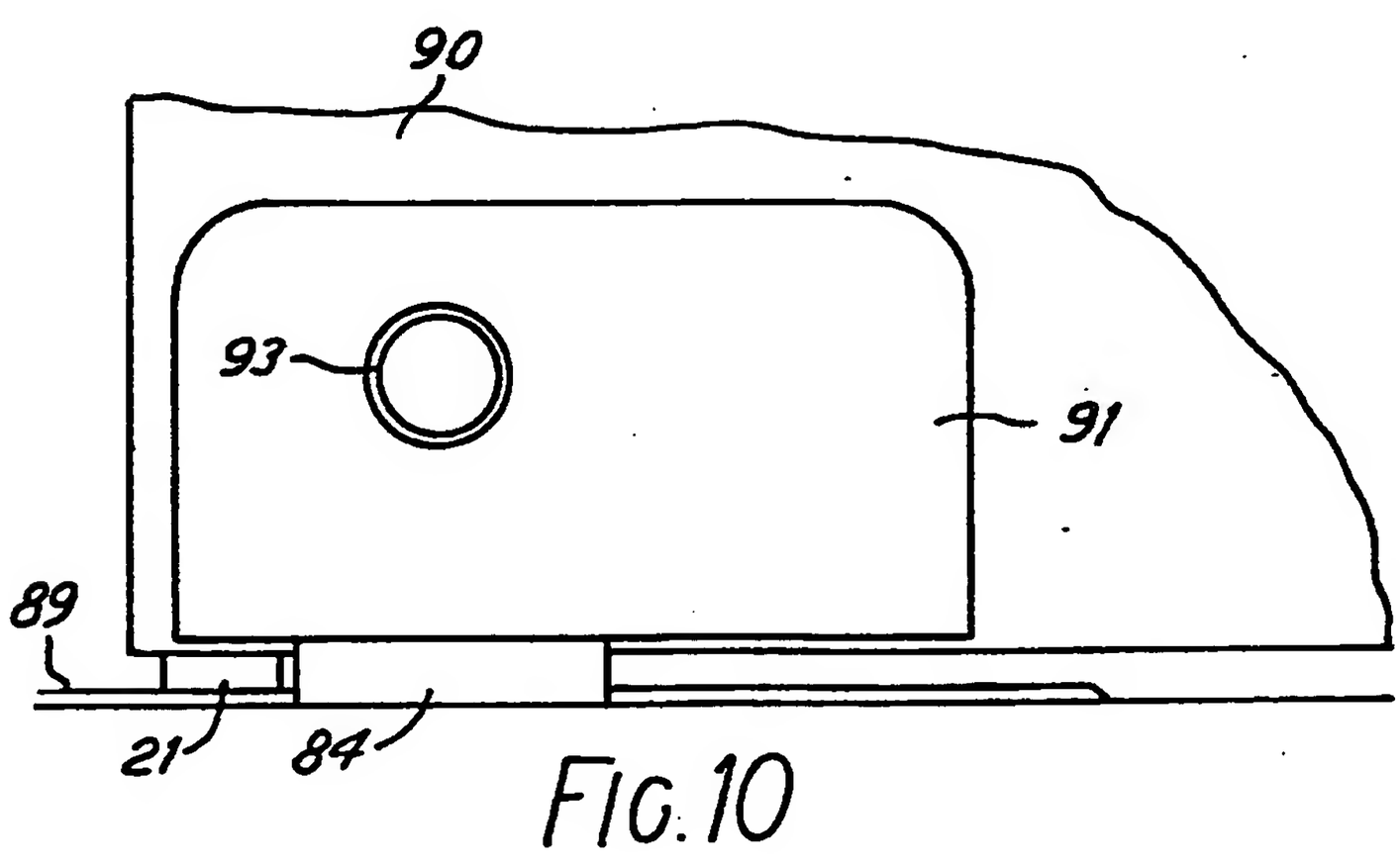

FIG. 10

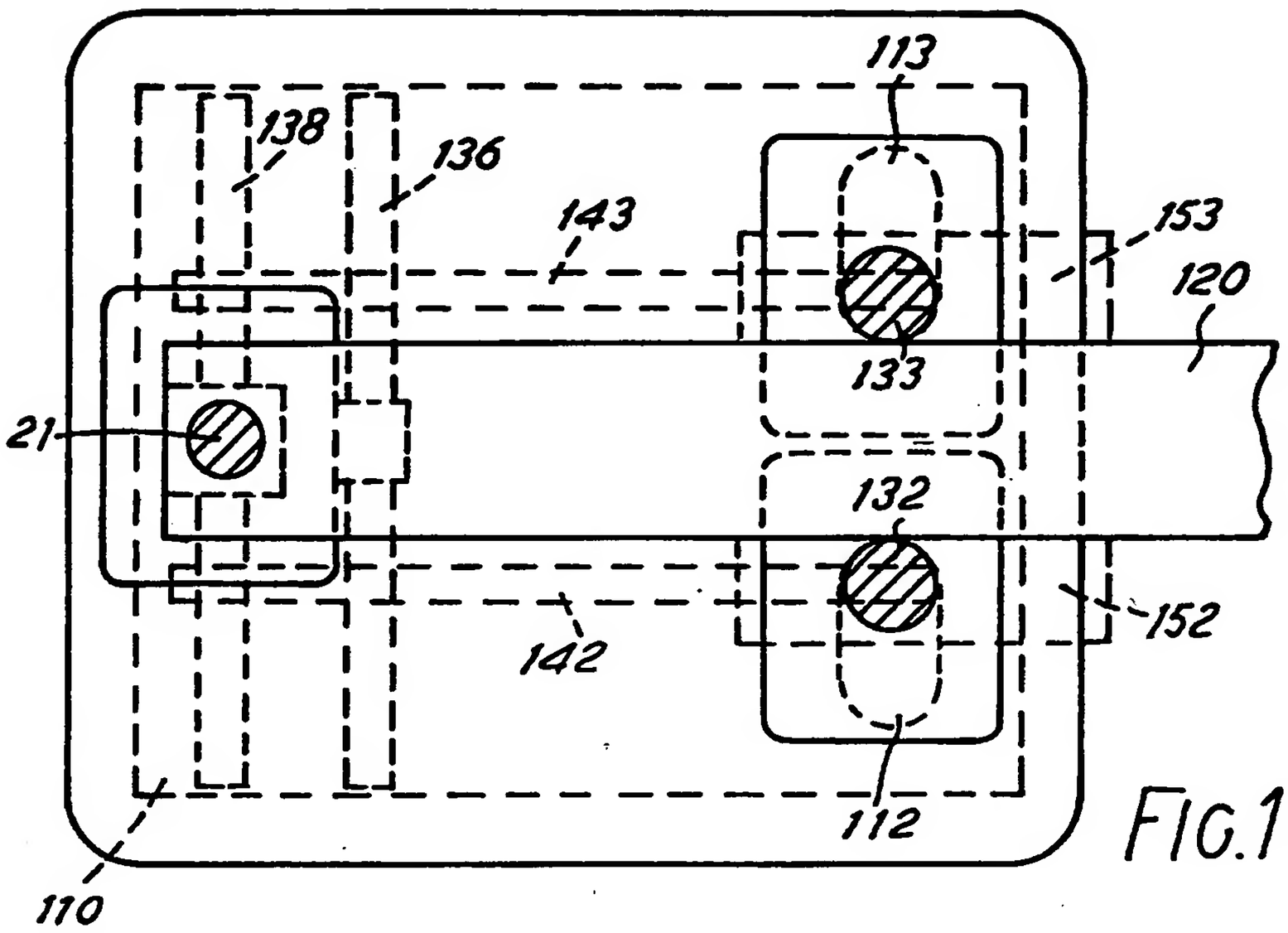
113
138
136
143
153
120
133
21
132
152
142
112
110

FIG.11

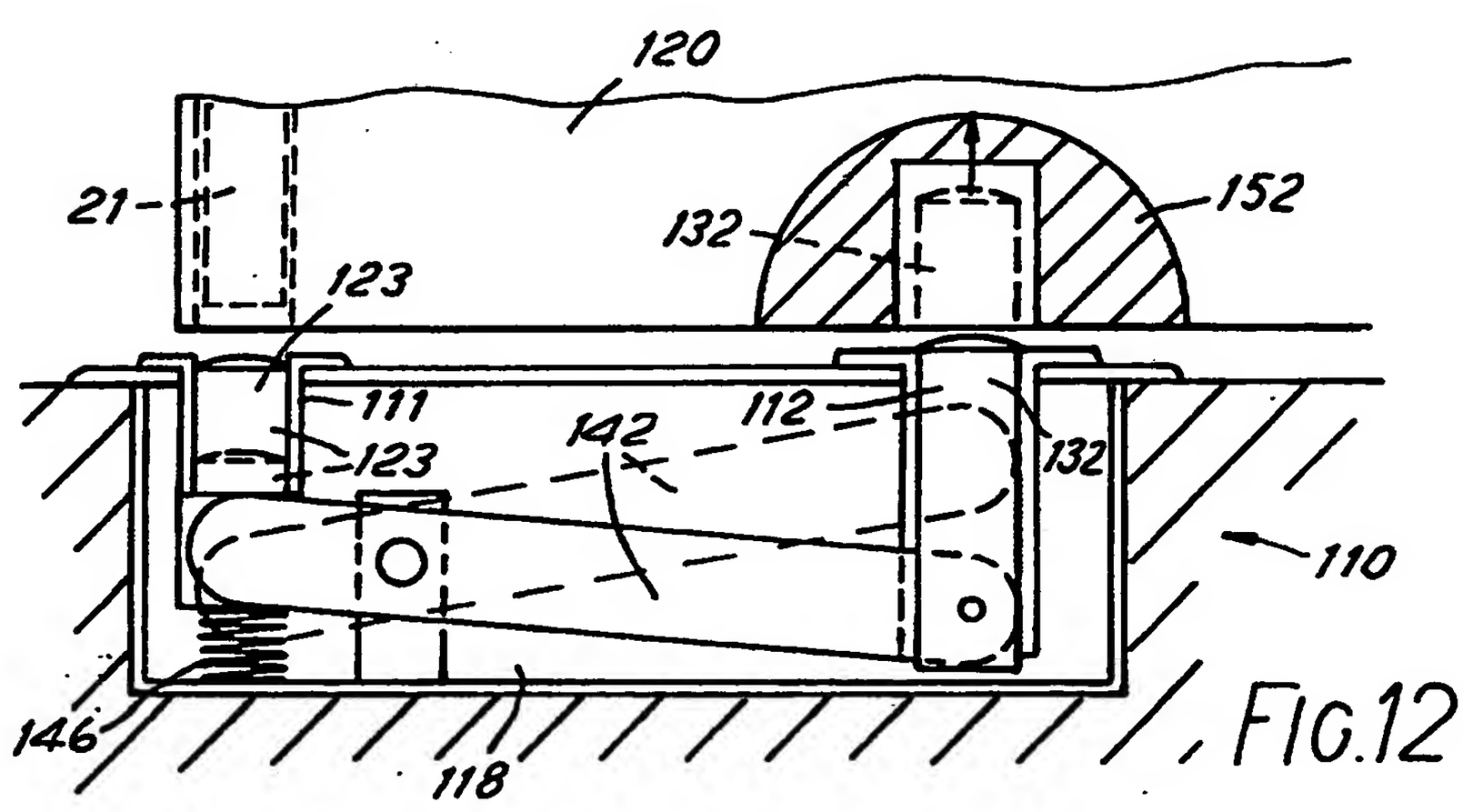
120
21
123
132
152
111
112
142
123
132
110
146
118

FIG.12

Securing means

The present invention relates to a securing means and more particularly to means for securing a door or similar flap or leaf member.

In one known form of door keep, a latch member recessed in the edge of a door actuates a similarly-recessed bolt to protrude from the bottom of the door to engage in a blind hole in the floor. The latch member and bolt are conveniently mounted within a U-shaped channel member embedded in the edge of the door. A disadvantage of such an arrangement is that if the secured door is subjected to lateral forces there is a tendency for the material thereof, usually wood, to split. This spoils the appearance of the door, can cause injury, and may lead to complete failure of the securing arrangement.

The present invention seeks to overcome or reduce the above disadvantage.

According to a first aspect of the present invention there is provided means for securing a flap member comprising an actuating means which actuates a bolt, both the actuating means and the bolt being mounted on the flap member, and an end of the bolt being actuable by the actuating means between a first position, in which it is substantially completely retracted within the flap member, and a second position, in which it protrudes from an edge of the flap member to engage in a hole in an adjacent fixed retaining device, wherein the hole contains a first movable member, movement of which in a direction away from the flap member by the bolt causes at least one second movable member to move in a direction generally towards the flap member but

into a position in which it overlaps a face of the flap member.

According to a second aspect of the present invention there is provided a retaining device for a flap member comprising a first bore for receiving the end of a bolt from the flap member and at least one second bore, the first bore containing a first movable member and the second bore containing a second movable member, movement of the first movable member along the first bore in a first direction being arranged to produce movement of the second movable member along and partly out of the second bore in a second direction.

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, of which:

Figs 1,2, and 3 show cross-sectional views of retaining devices in accordance with first, second and third embodiments of the present invention, for use with doors;

Fig.4 shows a side view of a door and retaining device in accordance with a fourth embodiment of the present invention;

Fig.5 is a plan cross-sectional view of the door and retaining device of Fig.4;

Fig.6 shows a front view of a keep plate of the embodiment of Figs 4 and 5,

Fig. 7 is a cross-sectional view of a retaining device in accordance with a fifth embodiment of the present invention, the device being in use;

Fig.8 is a view similar to Fig.7 of the device when not in use;

Fig.9 is a side sectional view perpendicular to that of Fig.7;

Fig.10 is a side view of the device of Fig.7 in use;

Fig.11 is a plan view of a retaining device in accordance with a sixth embodiment of the present invention; and

Fig.12 is a side view of the device of Fig.11.

Referring to Fig.1, there is shown the bottom of an edge of a 54mm door 20 having therein a vertically slidable bolt 21, only the bottom part of which is shown in the figure. The bolt 21 is operated in conventional manner by a manually-operated latch or lock, both the bolt and the latch or lock being conveniently mounted in a U-shaped channel member extending along a recess in the edge of the door.

Mounted in a recess in the floor beneath the door 20 in its closed position is a retaining device 10. Device 10 comprises a metal block 11 having three parallel bores 12,13,14 disposed therein. To retain the door in its closed position as shown, the bottom end of bolt 21 engages in the top of bore 13 where it engages and moves downwardly the top of a piston member 23 which has sealing rings 24. Piston member 23 is biassed upwardly within bore 13 by a compression spring 25 which, as shown, is compressed by the bolt 21.

Slidably-mounted within bores 12, 14 are respective retaining bolts 32,34 having sealing rings 36,38. The

three bores 12,13,14 are interconnected by passages 27,28. These passages and the parts of the bores beneath the piston and bolts are filled with a substantially imcompressible hydraulic fluid 40. A filling aperture with a screw closure plug 41 is provided for the hydraulic fluid.

The entire device 10 is conveniently mounted in a cement box (not shown) fitted in a recess below floor level 42. The metal block 11 has external side and/or bottom adjusters, to ensure correct positioning within the cement box, and a cover plate.

In use, downward movement of bolt 21 moves piston 23 downwards and, by virtue of the hydraulic fluid, bolts 32 and 34 upwards. The top ends of the retaining bolts protrude above the level of the bottom of the door 17 adjacent to the door. Thus if a sideways force is exerted on the retained door, it is unable to move by more than an insignificant amount and the stresses on the door are taken up by the entire thickness thereof. When bolt 21 is moved upwardly, spring 25 forces piston 23 upwards and, by virtue of the hydraulic fluid, bolts 32 and 34 are retracted.

Referring now to Figure 2, a device 50 in accordance with a second embodiment comprises retaining bolts 52,54 which are constructed in the form of pistons. The bores 12 and 14 are wider to accommodate piston heads 53,55, and additional compression springs 56,58 are provided at the top of the bores. These springs bear between shoulders in the bores and the tops of the piston heads and serve to assist the action of springs 25. To allow initial insertion of the bolts 52,54, the metal block 11 has a removable bottom plate (not shown). An advantage of this embodiment is that the

shoulders in bores 12,14 prevent bolts 52,54 from accidentally escaping and also ensure equal projection of the bolts from the bores.

A third embodiment of the present invention is shown in Fig.3 in which a retaining device 60 is in its disengaged position, i.e. bolt 21 is retracted within channel 22 which extends in a recess along the edge of door 20. The device 60 is adjustable in two ways. Firstly an adjusting screw 61 extends through piston 23 to adjust the force on the compression spring 25. Secondly an adjustable restrictor valve 62 is provided in passage 27 to enable the relative hydraulic pressure in the various parts of the device to be adjusted. A similar restrictor valve may be additionally or alternatively provided in passage 28.

Figs 4,5 and 6 show a fourth embodiment of the present invention in which one of the retaining devices 10,50 or 60 is used with a thinner door 70, e.g. 45mm thick. To prevent unwanted sideways movement of the door, keep plates 71 are attached to the door adjacent to the retaining bolts by means of screws or rivets 72.

The various features of the embodiments described may be combined as desired. Numerous further modifications may also be made. For example instead of a hydraulic connection between the central piston and the retaining bolts, there may be a pneumatic connection or a mechanical linkage. Alternatively, downward movement of the central piston may actuate electrical devices for raising the retaining bolts.

For use with doors thicker than the standard 54mm, the keep plates are mounted in recesses at the bottom of the door; this enables all other dimensions to remain

the same.

The retaining devices may be employed at the top of the door instead of or in addition to the bottom; in this case the devices may be embedded in the ceiling; also suitable modification of the actuation mechanism of bolt 21 is necessary. The retaining devices are usually employed with one of a pair of double doors. However, they may alternatively be used with a single door opening through 180°; in this case the bolt 21 is recessed in a channel in a major surface of the door, preferably adjacent to the leading edge thereof. It will be clear that if retaining devices are used for both of a pair of doors, at least one of them must have the channel 22 in a major surface.

For use with a single door opening through 90°, i.e. having a door stop, a modified retaining device is employed having only a single retaining bolt; this retaining device is more compact.

The actuating mechanism for the bolt 21 may be a lever, a handle or a key-actuated lock.

If the clearance of the bolt 21 in bore 13 is suitably small, this engagement may assist in resisting forces applied to the door.

Although preferably made of metal parts, except for the sealing rings, the retaining devices may be made of plastics material.

Although arrangements have been described in which the retaining bolts 32,34 move parallel to piston 23, other configurations are possible. For example, the retaining device may extend around a corner of the flap member

with downward movement of the piston 23 causing substantially horizontal retaining bolts to move horizontally to bracket the flap edge from the side rather than below.

Apart from a door for a building, the flap member to be retained may be any other sort of door, e.g. a safe door, or a window or other leaf member.

As mentioned above, the hydraulic retaining device 10,50 or 60 may be replaced by a device employing a mechanical linkage. Suitable devices of this type will now be described with reference to Figs 7 to 12.

Figs 7 to 10 illustrate a retaining device 80 in accordance with a fifth embodiment of the present invention for locking a door 90. As in the previous embodiments the door has a slidable bolt 21 which can be moved downwards beyond the bottom of the door. Device 80 has a decorative top plate 89 over a recess 88 housing a rotary spindle 81 journalled in the recess walls 82 at it ends. Fixed to the spindle for rotation therewith are bolt members 83,84, conveniently made of sheet metal material, e.g. hardened steel. The material of member 84 is folded so as to define an arm 85 which is located to be engaged by the bolt 21.

At each side of the door there is provided a keep or grip socket 91 defining an internal recess 92. The major side surface of each socket 91 has a through hole 93. The keeps 91 are preferably bolted together through the door 90 where possible for maximum strength. However, they may each be screwed to the door, especially where the path of bolt 21 would be in the way of through fixing bolts.

In use, downward actuation of bolt 21 causes it to engage arm 85 and to rotate this, together with bolt member 84, spindle 81 and bolt member 83 about the axis of the spindle as indicated by arrow A. This causes major portions of bolt members 83,84 to leave recess 88 and enter the recesses 92 of their respective sockets 91, thus firmly securing the door. In this position, part of the surface of each bolt member is visible through respective hole 93, thus confirming correct locking. On upward retraction of bolt 21, the weight of the major portions of the bolt members 83,84 is sufficient to rotate the spindle back to its inoperative position Fig.8.

The embodiment of Figs 7 to 10 has a number of advantages. It is relatively simple and cheap to manufacture. It is simple to install and easy to operate since only a relatively small force is required. With the bolt members 83,84 being shrouded by the keeps 91 in operation, they are protected from damage, e.g. by vandalism. Since no hydraulic components are used, there are no problems with leaking seals and maintenance is easier, requiring only the cover plate 89 to be removed; the most likely fault is slightly buckled bolt members 83,84 and these can easily be removed and replaced. A further advantage is that the distance travelled by the bolt members 83,84 (i.e. their shoot) is independent of the shoot of the flush bolt 21. Cover plate 89 is flush with the floor, which is important for the passage of wheeled units, e.g. trolleys.

The embodiment of Figs 7 to 10 may readily be adapted to cater for any normal door width by arranging for bolt members 83,84 to be fastened to spindle 81 by means of grub screws 101, 102. This enables the bolt

members to be fixed to spindle 81 at any desired axial position therealong as indicated by arrows B. The cover plate 89 requires corresponding modification.

In a modification, arm 85 may be separate from bolt member 84 and may be independently fixed to spindle 81. Also, if the position of bolt 21 is different, e.g. if it is face fixed instead of rebated, the position of bolt members 83,84 are adjusted accordingly. For use at the top of a door, bolt members 83,84 are merely provided with weights so that they return to leave a flush surface when the bolt 21 is retracted.

Figs 11 and 12 illustrate a retaining device 110 in accordance with a sixth embodiment of the present invention for locking a door 120. Device 110 has a recess 118 housing bores 111,112,113 for bolts 123, 132,133 respectively. Bores 112 and 113 have an elongated cross-section to cater for a range of door widths. Bolt 123 is connected by pivoted levers 142,143 to the bolts 132,133, so that when bolt 123 is depressed by bolt 21, bolts 132,133 enter respective sockets or keeps 152,153 at the sides of the bottom of the door. Levers 142,143 are pivoted on a bar 136 and are connected to bolt 21 via a parallel bar 138. The levers are connected to the bars by suitable releasable fixing means so that the levers may slide along the bars to cater for differing door widths. Upon retraction of bar 21 a compression spring 146 acts on bolt 123 to pivot the levers back to their original position and to retract bolts 132,133.

The above-described embodiment has the same advantages as the previously-described embodiments. In addition, since bolts 132,133 slide axially, keeps152,153 are relatively small.

In a modification, bores 112,113 are a close fit around their respective bolt; in this case the bores are drilled only after the door width has been decided. The features of the various embodiments described may be combined as appropriate.

Claims

1. Means for securing a flap member comprising an actuating means which actuates a bolt, both the actuating means and the bolt being mounted on the flap member, and an end of the bolt being actuable by the actuating means between a first position, in which it is substantially completely retracted within the flap member, and a second position, in which it protrudes from an edge of the flap member to engage in a hole in an adjacent fixed retaining device, wherein the hole contains a first movable member, movement of which in a direction away from the flap member by the bolt causes at least one second movable member to move in a direction generally towards the flap member but into a position in which it overlaps a face of the flap member.

2. Securing means according to claim 1, wherein the first and second movable members are also bolts and are interconnected by at least one pivotal lever.

3. Securing means according to claim 2, wherein the pivotal lever is resiliently biassed to the position in which the or each second movable member is moved away from the flap member.

4. Securing means according to claim 2 or 3, wherein the or each lever is pivotally mounted on a first bar member, is connected to the first movable member by a second bar member, and is axially movable along the bar members.

5. Securing means according to claim 1, wherein the first movable member is fixedly mounted on a pivotal spindle, the or each second movable member also being fixedly mounted on said pivotal spindle.

6. Securing means according to claim 5, wherein the or each second moving member is axially movable along said pivotal spindle.

7. Securing means according to claim 5 or 6, wherein the first movable member and a said second movable member are integral parts of a common movable member.

8. Securing means according to any of claims 5 to 7, wherein a said second movable member is weighted so that under the effect of gravity it tends to the position in which it is moved away from the flap member.

9. Securing means according to claim 1, wherein the first and second movable members are pistons interconnected hydraulically.

10. Securing means substantially as herein described with reference to Fig.1, Fig.2, Fig.3, Figs 4 to 6, Figs 7 to 10, or Figs 11 and 12 of the accompanying drawings.

11. The combination of securing means according to any preceeding claim and a flap member, the flap member having one or more respective keep sockets for receiving the or each second movable member.

12. The combination of claim 11 wherein a said keep socket has a window, through which the presence of the respective second movable member may be detected.

13. The combination of a securing means according tO any of claims 1 to 10 and a flap member, the flap member being provided with one or more respective keep plates for engagement with the or each second movable member.

14. The combination of a flap member and associated securing means substantially as herein described with reference to Fig.1, Fig.2, Fig.3, Figs 4 to 6, Figs 7 to 10, or Figs 11 and 12 of the accompanying drawings.

15. A method of securing a flap member substantially as herein described.

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